

Washington Space Grant Consortium
University of Washington
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Washington Space Grant Consortium is a Designated Consortium funded at a level of \$575,000 for fiscal year 2013.

PROGRAM GOALS

The overall objective of Washington NASA Space Grant Consortium is to provide high quality programs that align with the NASA Office of Education Outcomes and serve the needs of our state. WSGC seeks to enhance higher education opportunities for students seeking to pursue careers in the fields of science, technology, engineering and math (STEM); to enrich and improve STEM education at Washington's diverse pre-college, college, university and community learning centers; and to provide public outreach for NASA missions, and thereby strengthen the future workforce for NASA and our nation. To that end, our goals are as follows:

- To attract and retain high-achieving students, especially those underrepresented in the sciences, technology, engineering and mathematics, to space-related degree programs and career tracks supporting NASA's missions.
- To support the integration of research and education in NASA-related fields at the undergraduate and graduate levels.
- To support faculty interested in deepening ties to NASA research and the development of research infrastructure at consortium member institutions.
- To increase collaborative efforts of university scientists and students with industry leaders in aerospace-related programs.
- To enhance the teaching of science, technology, engineering and mathematics and to attract students to these fields of study through engaging informal and formal education programs based on NASA's missions on Earth and in space.

- To share the excitement and knowledge gained from NASA’s missions with the general public.
- To strengthen collaborative efforts within the Consortium as well as with industry, community, and governmental organizations to support NASA and WSGC goals and activities.

We provide here a narrative report on our progress toward last year’s specific goals and metrics.

PROGRAM/PROJECT BENEFIT TO OUTCOME (1, 2, & 3)

OUTCOME #1: EMPLOY AND EDUCATE: A pilot program of private industry summer internships in FY2013 offered an opportunity for Everett Community College (EvCC) mechanical engineering students to work in the aerospace industry. The community college has strong industry ties with engineering ranking as one of its top five study areas. The school recently began construction on a \$3.5 million Advanced Manufacturing Training and Education Center, intended to train students for jobs in aerospace and manufacturing. Christian Dinsmore was placed with Electroimpact, the largest integrator of aircraft assembly lines in the world with customers that include The Boeing Company, Spirit Aerospace and Northrop-Grumman among others. Amy Felt worked at Janicki Industries, which designs and builds high-precision parts and tooling for aerospace and wind energy customers. Amy completed her WSGC internship in August and immediately began a fluids and propulsion engineering internship at NASA Kennedy Space Center.

OUTCOME #2: EDUCATE AND ENGAGE: For the past five years, WSGC has supported Washington Aerospace Scholars (WAS), a statewide program for high school juniors, by recruiting students, mentors and teachers, providing student feedback from STEM professionals, and hosting university and college campus tours. Beginning in FY2013, all WAS participants had the opportunity to earn five hours of University of Washington credit when they successfully complete the online WAS curriculum. The course (ESS102-DL) was developed in partnership between UW and NASA and tested in FY2012. It consists of 10 bi-weekly lessons and a final project. Each lesson has tasks, collectively called a “mission” that include a reading quiz, a space-related math problem, and a 500-word essay (some of which require students to create graphics), plus virtual lab activities; it is estimated that each lesson will take 12-15 hours to complete over each two-week period. In FY2013, 63% of WAS participants opted to enroll in the credit course.

OUTCOME #3: ENGAGE AND INSPIRE: For more than a decade, the Pacific Science Center’s Science on Wheels program has been a key component in WSGC’s professional development for teachers and informal education projects. Six different van programs are available, offering exhibits and hands-on programs in astronomy and space science, engineering, geology, math, and physics. The programs (full and part day) are designed to deliver a standards-based, science center experience to underserved schools and communities that are unable to access PSC itself. Science on Wheels programs have been presented statewide at in-school classes and at afterschool programs, as well as science fair and community events. WSGC support in FY2013 allowed PSC's Science on

Wheels program to provide 15 elementary schools and one middle school with "science center" experiences, complete with exhibits, classroom lessons and hands-on activities, reaching 5,288 students and 377 teachers in underserved communities. As an example of the program's outreach to underserved communities, in January 2014 the Space Odyssey van, which includes an inflatable planetarium, participated in the Tri-Cities Family Expo, reaching 2,150 children and 1,350 adults over two days. In the Tri-Cities, approximately 30% of the population identify as Hispanic or Native American.

PROGRAM ACCOMPLISHMENTS

Outcome 1: *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals: (Employ and Educate)*

SMART Goal #1: *Diversity - To attract and retain high-achieving students underrepresented in the sciences and engineering into higher education institutions statewide, to space-related degree programs and career tracks supporting NASA's missions.*

Metric 1.1: Award WSGC scholarships and research internships to underrepresented minority students at or above 17%; enroll underrepresented minority students in higher education courses at or above the percentage of their undergraduate enrollment in the UW College of Engineering for the year.

Progress to date: Not met. Of the 179 significant awards for scholarships and research internships in FY2013, 14.53% went to underrepresented minority students, based on the number of the students who chose to indicate race. This does not meet our goal of 17% enrollment nor does it meet the enrollment percentage for underrepresented minorities (URMs) in our state (16.7% according to the 2012 enrollment data from the National Center of Education Statistics Digest, Table 306.60). Of the 594 students who have enrolled in our higher education courses to date, 8.4% identified as URMs, compared to UW College of Engineering's 10.1% URM enrollment for 2013. This decline is due to the fact that some of our strongest candidates have received competitive offers from other programs that also aid URMs in STEM. In order to make a course correction, we are actively soliciting collaborations with these organizations to expand the pool as opposed to competing for the same pool. It is anticipated that through this more proactive approach we will continue to meet our goal in this area as we did last year.

Metric 1.2: Award WSGC scholarships and research internships to women undergraduates at or above 40%; enroll women in higher education courses at or above the percentage of their undergraduate enrollment in the UW College of Engineering for the year.

Progress to date: Met. Women undergraduates received 52.47% of our 162 significant awards to undergraduates for scholarships and research internships. Enrollment of women in our higher education courses was 27.4%, compared to the 25.1% enrollment of women in the UW College of Engineering in 2013. This enrollment percentage is down by 3.1% over last year but should increase once Spring Quarter enrollment opens, as those WSGC-supported courses traditionally enroll more women.

Metric 1.3: Foster strong programs at our minority serving institutions including partnerships with other affiliates so they may tap into the state's research colleges while developing more opportunities for their students to participate in hands-on research.

Progress to date: Met. Details are provided under Program Contributions to NASA Education Performance Measures: Minority-Serving Institutions Collaborations.

SMART Goal #2: *Scholarships & Fellowships - To attract and retain high-achieving students statewide, especially those underrepresented in the sciences and engineering, to space-related degree programs and career tracks supporting NASA's missions.*

Metric 1.4: Continue WSGC's undergraduate scholarship program through its academic affiliates and partners to provide 60 scholarships to undergraduate students statewide.

Progress to date: Met. In FY2013, WSGC awarded 106 significant undergraduate scholarships at five affiliate institutions (NWIC, SCCC, UW, WSU and WWU). Of these awards, 19% included research participation.

Metric 1.5: Continue WSGC's graduate fellowship program at the state's two primary research universities (UW and WSU) with a minimum of 12 fellowships per year.

Progress to date: Met. In FY2013, WSGC awarded 17 graduate fellowships at UW and WSU. Fields of study included astronomy, chemistry, physics, Earth and space sciences, environmental science, aeronautics and astronautics, and mechanical engineering.

Metric 1.6: Enhance support for students in community colleges and/or community college students with associate degrees transferring to four-year colleges, awarding 10 scholarships annually.

Progress to date: Met. In FY2013, WSGC awarded nine scholarships to Seattle Central Community College students and four to UW transfer students, representing alumni from four community colleges (North Seattle, Seattle Central, Highline, and Everett). The UW transfer scholarship program is one of only three UW scholarship programs aimed at recruiting community college students and retaining them through graduation. Everett Community College, which offered WSGC scholarships in past years, instead awarded WSGC private industry internships.

Metric 1.7: Achieve 95% retention in STEM disciplines of all scholarship awardees.

Progress to date: Almost met. Of our 2006-2011 students who received significant support and were successfully tracked, 92% remained in STEM fields. This is the same percentage as reported for FY2012. We will continue to employ retention tools such as formal and informal student meetings with our student advisor, content-specific peer tutoring and networking opportunities.

Metric 1.8: Establish regular communication with WSGC scholarship and fellowship alumni from all consortium institutions through our longitudinal tracking system and social networking sites. Target: 65% alumni tracked by the end of FY2014.

Progress to date: Met. NASA requires tracking of all significant award recipients after 2005; Education Programs Support Services (formerly operated through the National Space Grant Foundation) provides our tracking system. To better ascertain WSGC's long-term impact on our alumni, we have encouraged our pre-2005 alumni to also participate in the tracking system. By 2012, 69.6% of our alumni (1997-2012) had updated their tracking record to their next step at least once. We distribute news and career opportunities to our alumni through the NASAAlumni listserv and Facebook. We plan to add a LinkedIn group before the end of FY2013, as this seems to be the social media most used by the engineering school alumni.

SMART Goal #3: *Research Infrastructure - To expand participation in existing WSGC-sponsored undergraduate research and NASA internships; to increase collaborative efforts of university scientists and students with industry leaders in aerospace-related programs by establishing summer industry intern programs among all members of the consortium; to support the expansion of research opportunities for graduate and undergraduate students to work with STEM-field faculty across the state of Washington, particularly women and underrepresented minority students and faculty, as well as early career faculty; and to support teams in NASA-sponsored and/or aerospace activities and competitions.*

Metric 1.9: Continue to support an active WSGC-sponsored undergraduate research program within our higher education affiliates, with 60 undergraduate researchers.

Progress to date: Met. WSGC made 71 total awards (59 significant awards) to undergraduate students at nine academic affiliates (UW, CWU, NWIC, SCCC, SU, UPS, WWU, Whitman, and Whitworth) and one unaffiliated institution. Of the 71 total research awards in FY2013, 13 were made to students who also received scholarships (all of these were significant awards).

Metric 1.10: Continue support of our summer industry internship program with local companies involved in STEM research and expand the program when opportunities arise, with a target of four internships.

Progress to date: Met. In FY2013, we awarded seven WSGC private industry internships. Five students received Space Grant Private Industry Internships, open to students from all WSGC affiliates; two students received industry internships through the EvCC private industry pilot program, described earlier. Four of the Space Grant Private Industry summer interns were placed at Eagle Harbor Technologies, Tethers Unlimited Inc. and Woodruff Scientific. Aerojet Rocketdyne requested that its Space Grant intern begin in Spring Quarter, due to project requirements; he is now employed full time at Aerojet as a software engineer.

Metric 1.11: Foster closer ties with our private sector partners through participation in at least one research symposium.

Progress to date: Met. Three of our four industry partners sent representatives to the WSGC annual reception and poster session. A representative from the electric propulsion and integrated systems division at Aerojet Rocketdyne presented the awards for participants in summer internships in private industry and at NASA centers. WSGC leadership continues to collaborate with Eagle Harbor Technologies (EHT) on their two successful NASA Phase I SBIR proposals for the development of a micro-thruster for formation flying of multiple spacecraft and for space debris mitigation. WSGC leadership serves as principal investigator and collaborates with Tethers Unlimited Inc. on a 2013 NASA Innovative Advanced Concepts (NIAC) Phase II project aimed at sample return systems for extreme environments. We are also working with EHT and Tethers to develop a CubeSat program to be funded through the state's Joint Center for Aerospace Technology Innovation (JCATI).

Metric 1.12: Continue support of a summer NASA internship program and ensure access to students by providing partial funding for six NASA interns.

Progress to date: Met. In FY2013, five students from three Washington schools (UW, NWIC, and Walla Walla University) received full WSGC funding to participate in research internships at NASA Centers. A sixth student received full WSGC funding to

participate in the Helicopter/UAS (Unmanned Aerial Systems) Workshop, offered by Connecticut Space Grant Consortium.

SMART Goal #4: *Higher Education - Provide NASA competency-building education and research opportunities for faculty, researchers, and post-doctoral fellows; develop and expand participation in NASA-related courses for integration into STEM disciplines; provide NASA competency-building education and research opportunities to individuals to develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, industry, and higher education.*

Metric 1.13: Support the integration of NASA-related research and education at the undergraduate and graduate levels through three or more courses that focus on results from NASA missions or provide experiential learning opportunities in aerospace. [Target: Support a total of 3 courses, reaching 350 students.]

Progress to date: Met. UW ESS 102 (Space & Space Travel) was offered in fall and Winter Quarters of the 2013-2014 academic year; enrollments were 185 and 188 respectively. ESS 472/575 (Rockets and Instrumentation) was offered fall and Winter Quarters, with a total enrollment of 70. Enrollment increased in the distance-learning version of UW ESS 102, developed to allow high school juniors in the statewide Washington Aerospace Scholars (WAS) program to earn five hours of university credit for their WAS participation. In FY2013, enrollment was 152, up 31% over the previous year. ESS 495 (NASA Science and Engineering Research Seminar) and ESS 205 (Access to Space) will be offered Spring Quarter. We have begun collaborating with UPS and EvCC faculty to develop a version of ESS 205 for their students in 2015.

Metric 1.14: Augment the opportunities for students at minority serving institutions and community colleges to participate in opportunities at our state's larger colleges including hands-on courses/research internships and the NWIC rocket program. [Target: 4 MSI/CC students in hands-on research annually].

Progress to date: Met. As detailed in Program Contributions to NASA Education Performance Measures: Minority-Serving Institutions, WSGC supported 3 NWIC students conducting environmental science and global climate research and 1 EdCC student conducting physics research with CWU faculty. The NWIC rocket team will receive their travel awards this spring. SCCC Undergraduate Research Experiences (SURE), a program to increase transfer/graduation rates of STEM majors to baccalaureate institutions and strengthen the community college's ties to our state's four-year institutions, also makes their WSGC student awards during Spring Quarter.

Outcome 2: *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty: (Educate and Engage)*

SMART Goal #5: *To enhance teaching of STEM topics at a K-12 level and attract students to these fields through engaging informal and formal education programs based on NASA themes and materials; to provide courses and workshops to improve teachers' mastery of STEM disciplines and through those projects help Washington students (especially those from underserved communities) meet state and national standards; to provide hands-on research experiences for pre-service teachers in STEM fields.*

Metric 2.1: Support 21 technical or professional development workshops for in-service teachers, with at least one workshop in a rural area serving a traditionally underserved population.

Progress to date: Met. The North Central Educational Service District (NCESD) conducted 31 WSGC-supported workshops in underserved rural communities with high poverty (61% of the students receive free or reduced-price lunches) and large Hispanic and Native American populations, reaching 338 K-12 teachers. The NCESD workshops target the region's teachers of physical, Earth and/or space science to strengthen their pedagogical and science content knowledge. In FY2013, the material focused on the Next Generation Science Standards (NGSS), with an emphasis on engaging all students (including migrant, bilingual and ELL students). These teachers, in turn, are charged with bringing current STEM information and NGSS transition tools back to their school districts, where they train others. In April 2014, WSGC will host a second Yakama Nation Blast-off in conjunction with the Yakama Nation Land Enterprise, Yakama Power, and the University of Washington's Indigenous Wellness Research Institute (IWRI). This year the event will be a professional development workshop on rocketry in the classroom, and offered to high school teachers at schools serving the Yakama Nation and adjoining communities.

Metric 2.2: Provide research experiences for a minimum of seven pre-service teachers in STEM fields each year.

Progress to date: Met. Nine future K-12 teachers in the Science, Mathematics, and Technology Education (SMATE) Program at Western Washington University were placed in research experiences. SMATE participants complete both a major in a STEM discipline and either the elementary or secondary education program. The WSGC scholars created a poster describing their research and participated in a seminar to discuss how their experiences will improve their inquiry-based educational methods and relate to their future teaching.

Metric 2.3: Collaborate with the Washington Aerospace Scholars (WAS) program to expand opportunities for high school juniors with STEM career interests and enhance program capacity by supporting the training of 16 in-service teachers/mentors to remain with WAS year-round.

Progress to date: Met. In FY2013, WSGC supported the recruitment of 10 state-certified STEM teachers to mentor high school juniors participating in the WAS program's online NASA curriculum and in the 2014 summer residency at the Museum of Flight. We continue to collaborate with the Museum of Flight on a UW distance learning course for WAS students (described in Metric 1.13). Last summer, 157 students attended the residency; in November 2013, 308 students applied to the online program. Of the WAS alumni now in college, 75% of the 862 program alumni are pursuing a STEM degree, with 48% of those alumni studying engineering.

Metric 2.4: Support teacher participation in national conferences focused on NASA science mission results or participation in NASA-sponsored science competitions, with a target of two opportunities for in-service teachers and/or K-12 teacher-student teams.

Progress to date: Met. WSGC continues to support professional development activities at Key Peninsula Middle School, the state's first NASA Explorer School. In FY2013, we are providing funds for their STEM team to attend the National Science Teachers Association Forum and Expo, May 14-17. WSGC travel funding for the team lead to

meet with researchers at the University of Arizona and NOAO to share results and discuss next steps was also approved. That trip, originally scheduled for November 2013, was postponed until 2014. The team lead has also been invited to present at the 40th COSPAR Scientific Assembly in August 2014 on how authentic research experiences for middle school students, utilizing space sciences and career readiness standards, can help eliminate the poverty gap, as documented on Washington state assessment tests of eighth grade students. WSGC provided funding for professional development to support many of these research experiences.

Metric 2.5: Produce an electronic newsletter twice monthly during the school year to connect educators, informal and formal, with relevant NASA-related materials, curriculum ideas, Internet links and other STEM resources.

Progress to date: Met. The WSGC e-letter reached 944 direct subscribers, including secondary distribution networks such as the Washington Science Teachers Association listserv (1,600 subscribers) and the Edmonds Homeschool Resource (130 subscribers). Newsletters are e-mailed twice monthly during the school year and once a month in the summer. They are publicized via social media and publicly archived at two online sites.

Outcome 3: *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire)*

SMART Goal #6: *To share the excitement and knowledge gained from NASA's missions with the general public; to strengthen collaborative efforts within the consortium as well as with industry, community, and governmental organizations to support NASA and WSGC goals and activities; to provide informal education support resources that use NASA themes and content to enhance participant skills and proficiency in STEM disciplines and inform participants about STEM career opportunities; and to support Washington's museums and science centers in their efforts to engage the public in major NASA events.*

Metric 3.1: Utilize print and electronic publications to generate excitement about NASA's missions, publicize scholarships, fellowships and research opportunities, and foster collaboration among consortium institutions.

Progress to date: Met. In FY2013, the WSGC website was updated at least once a month and an online scholarship application system was developed. For security purposes, the pilot program was housed on a separate server and unique visitors to the application pages were not captured by our web analytics. This resulted in an average of only 2,245 unique visitors monthly over the past 10 months, a 22% drop in traffic over FY2012. In February 2014, all of our servers were upgraded; we anticipate our analytics should be consistent throughout the site from this time forward. We continue to use our YouTube channel, Expanding Frontiers blog and other social media for the timely dissemination of NASA-related opportunities, WSGC affiliate and alumni news, and other STEM news and opportunities. NASA-related opportunities are also disseminated to our members and targeted groups (students, alumni, the general public, etc.) via e-mail lists, a public calendar of events, and our regular e-letter for educators.

Metric 3.2: Work with informal organizations such as museums to provide at least one relevant science activity each year at a major event or exhibit.

Progress to date: Met. In FY2013, the Museum of Flight utilized its WSGC support to reach 420 in-service teachers through 20 professional development workshops on astronomy, aviation and space science, as well as open houses and advisory meetings. As noted earlier, PSC's Science on Wheels program provided 15 elementary schools and one middle school with "science center" experiences, complete with exhibits, classroom lessons and hands-on activities, reaching 5,288 students and 377 teachers in underserved communities. At the Tri-Cities Family Expo, the Space Odyssey van reached 2,150 children and 1,350 adults over two days. WSGC also funded professional development training for 11 high school students participating in the PSC Discovery Corps, a volunteer program where students ages 14 and up gain job and life skills while learning more about STEM and working to provide Pacific Science Center's guests with a unique and interactive experience, in many cases utilizing NASA materials and activities. In addition, WSGC provided funding for an additional 80 PSC public planetarium shows. For the first time, WSGC partnered with Washington Sea Grant in support of the 2014 Orca Bowl. As the regional competition of the National Ocean Sciences Bowl, the event draws high school teams from across Washington State to test their knowledge of the world's oceans. Students tackle questions in all areas of marine studies, including ocean-related physics, chemistry, geology, biology and technology. WSGC also continues to sponsor and help judge the Washington State Science & Engineering Fair, which drew 550 student competitors in grades 1-12, primarily from rural school districts. Four graduating seniors (one male and three female, one underrepresented) received book scholarships for their winning WSSEF entries; one student went on to win the Fourth Place Grand Award and the Society for Experimental Test Pilots Award at the Intel International Science & Engineering Fair for his supersonic aircraft wing design experiment. Our associate director serves as vice president of the board of IGNITE, which produces events that encourage middle school students and girls to pursue STEM careers.

Metric 3.3: Provide materials for museum and public events that showcase NASA missions at least once a year and regularly publicize NASA-related programs at WSGC museum affiliates via our newsblog, educator e-letter and mailing lists to students. Provide materials for at least one new informal education event.

Progress to date: Met. In FY2013, WSGC supported development and presentation of the new Earth Energy Show, an interactive, live experience for grades 4-6, showcasing NOAA's Science On a Sphere system. Delivery took place in June 2013; five of the 17 classes to view and evaluate the exhibit to date received need-based transportation stipends and attendance scholarships. Our associate director collaborated with informal educators at PSC to create a new Portal to Current Research exhibit titled, "Exploring Our Solar System With Local NASA Scientists." The exhibit features digital media, graphics, objects and interactive displays and programs focused on space weather and remote sensing on Mars. Portal to Current Research is an NSF-funded effort to connect the public with current research in relevant, engaging and inspiring ways. Materials were also distributed at the Museum of Flight's Educator Open Houses and Roboquest, a free family-focused education event at the 2013 Space Elevator Conference.

Metric 3.4: Work more closely with consortium members to assure coherence in WSGC programs, to share expertise and resources, and to bring together students and faculty from all institutions to present their research. [Target: One face-to-face meeting annually.]

Progress to date: Met. In FY2013, members collaborated in selecting candidates for internships, advertising student opportunities and events, developing curriculum and other WSGC projects. Our annual fall awards reception and poster session drew participation and/or attendance by students and faculty from seven of WSGC's higher education affiliates, with a display of more than 65 posters by WSGC student researchers, graduate fellows and interns. The annual WSGC statewide planning meeting is scheduled for April 2014.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Current data for FY2013 show that WSGC made 192 total awards. Of those, 179 were significant awards, including 123 significant awards in the Fellowship/Scholarship category and 56 in the Higher Education/Research Infrastructure category. Of the students who chose to indicate race, 27 of the total awardees are from underrepresented groups. During the FY2013 program year, 143 students who received WSGC support from FY2006-2013 took their next step. Of those, 53 are pursuing advanced degrees in STEM disciplines, 1 accepted a STEM position at a NASA contractor, 54 accepted STEM positions in industry, 6 accepted STEM positions in K-12 academia, 13 accepted STEM positions in academia, and 15 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing when they received their Space Grant awards.
- **Minority-Serving Institution Collaborations:** For FY2013, WSGC's tribal college affiliate, Northwest Indian College, received \$20,000 NASA funding and provided matching funds of \$5,000 for scholarships and research projects. NWIC reported that three student awards were made with FY2013 funds. Awards were based on a combination of need and merit. All awardees were pursuing Bachelor of Science degrees in Native Environmental Science. Student research internships focused on topics of water quality and natural resource management. Also included is travel funding for members of the NWIC rocket team to compete for a fifth year in the First Nations Rocket Launch on April 5, 2014. In addition, WSGC provided airfare and a \$6,000 stipend for one NWIC student to participate in a NASA Academy summer internship at NASA Goddard Space Flight Center. Students from the previous NWIC Rocket Team and the NASA Academy intern (also a rocket team member) presented the results of their research at the 2013 Space Grant Awards Reception and Poster Session. For the past two summers, their faculty advisor has served as a Native American Research Team Mentor at NASA's Ames Research Center, in part due to his team experiences. WSGC continues to seek out ways for its minority-serving institutions to tap into NASA and the state's research colleges while accomplishing our SMART goals of providing opportunities for hands-on research and fostering affiliate partnerships. Last summer, WSGC conducted hands-on activities on the UW campus with students from NWIC's Summer Science Camp, a program designed to engage Native American high school students with STEM research and the college enrollment process. In March, UW and NWIC rocketry students and faculty will

collaborate in a series of launches in the Black Rock Desert. NWIC will send 10 students and one instructor; the UW group will be composed of 40 students, one instructor and one teaching assistant. Students will work together to launch multiple high-powered rockets with the capability of reaching 60,000 feet.

- **NASA Education Priorities:** In FY2013, WSGC accomplishments relate to the following "Current Areas of Emphasis" stated in the 2010 Space Grant solicitation:
 - Authentic, hands-on student experiences in science and engineering disciplines — experiences rooted in NASA-related, STEM issues — were supported through student research programs on member campuses, at NASA centers and in private industry = 82 awards to 67 students; development and support of 1 undergraduate course = 70 students (Objectives 1.9, 1.10, 1.11, 1.12, 1.13 and 1.14). These were also supported through teacher professional development = 348 in-service teachers and the PSC Discovery Corps and WAS program = 168 high school students (Objectives 2.1, 2.3, 2.4 and 3.2).
 - WSGC engaged middle school teachers in hands-on curriculum enhancement capabilities through short- and long-duration workshops provided by NCESD = 8 workshops/34 in-service teachers; research experiences for pre-service teachers = 9 pre-service teachers. (Objective 2.1).
 - Providing summer opportunities for secondary students on college campuses was accomplished through our participation in the WAS program's summer residency, which targets high school juniors = 157 students. (Objective 2.3).
 - Community College relationships were created and strengthened through research experiences on campus and in private industry = 3 students. (Objectives 1.11, and 1.14).
 - Aeronautics research was supported through scholarships and fellowships = 9 students; internships on campus, in private industry and at NASA Centers = 12 students; 2 courses = 70 students. (Objectives 1.4, 1.5, 1.6, 1.9, 1.10, 1.12, 1.13, and 1.14).
 - Research in environmental science and global climate change is supported through fellowships, scholarships and internships = 34 students (Objectives 1.4, 1.5, 1.6, 1.9, 1.12, 1.13, and 1.14).
 - WSGC supports diversity of institutions through the membership of 2 minority serving institutions (HU and NWIC) and 4 community colleges (EdCC, EvCC, SCCC and NSCC) and through faculty and WSGC representatives = 24 female and 3 underrepresented minorities. WSGC also supported diversity by meeting specific metrics for participation by women and underrepresented minorities in scholarships and fellowships, research and higher education programs = 101 total female participants (93 significant awards) and 27 underrepresented minority participants (26 significant awards). (Objectives 1.1, 1.2, 1.3 and 1.14).

IMPROVEMENTS MADE IN THE PAST YEAR

WSGC continues to seek out ways to reduce administrative costs and leverage our NASA funding. In FY2013, we reduced the position of program coordinator from 100% FTE to

80% FTE for a savings of approximately \$6,500. While our overall number of awards decreased in FY2013, the percentage of significant awards was up 19.2%. We established a new collaboration with the Washington State Opportunity Scholarship (WSOS), a public-private partnership that includes major employers such as The Boeing Company and Microsoft. The partnership aids students whose families earn up to 125% of the median family income in attaining bachelor's degrees in high demand fields in science, technology, engineering, and math. In FY2013, WSOS funded four participants in the Space Grant Summer Undergraduate Research Program (SURP). We continue to prioritize our enrollment goal for scholarships and research internships of 17% for underrepresented minorities and 40% for women, and to strengthen the pipeline to bring more students from both groups into higher education. In that effort, we continue to collaborate with the Pacific Northwest Louis Stokes Alliance for Minority Participation (PNW LSAMP), placing one of their students in SURP and co-funding two Space Grant scholarship recipients. These two partners provided a total of \$16,000 in additional direct student funding. In summer 2014, we will partner with the UW College of Engineering to support an intern in their NSF Research Experience and Mentoring Program, an eight-week residential program for incoming freshmen from underrepresented and underserved populations.

We strongly encourage innovation and self-evaluation among our affiliates and partners, as demonstrated by Everett Community College's decision to switch from scholarships to internships. For the past three years, WSGC has been moving toward online applications for all scholarships, fellowships and research programs competed and/or administered through our main office. In FY2013, we moved the last UW scholarship applications online and anticipate that this will reduce the cost of printing and staff time. Whitworth University implemented a new strategy to increase the effectiveness of their summer research program. Students who successfully completed the research during the previous summer were enrolled in a one-credit research course during the academic year. Prospective students who applied to conduct research the following summer were asked to enroll in a regular three-credit course on computational physics. Finally, once the two students who would start research over the summer were selected, the returning students from the previous summer were asked to mentor the students who would start the next summer. This eased the transition for the new students in learning the hands-on details and also gave them confidence to engage in it.

At the precollege and informal education levels, we continued to emphasize a multi-pronged approach toward increasing diversity throughout the educational pipeline. In FY2013, NCESD focused its professional development workshops on giving teachers in underserved school districts the tools and confidence to more smoothly transition to the New Generation Science Standards. The Yakama Blast-Off event, offered last year through the Yakama Nation as an all-age, informal education event, will be offered this spring as a professional development workshop for in-service teachers. The goal is to establish out-of-school rocketry programs and competitive rocket teams at area high schools.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

WSGC is comprised of 14 member institutions and seven industry and educational partners, which are described below:

Higher Education

- *University of Washington*, the lead institution, is a major research university, receiving \$1.47 billion in research grants and contracts in FY2012.
- *Central Washington University*, a public four-year university serving Central Washington, with 20% of its recent incoming classes being students of color (largely Hispanic/Latino).
- *Heritage University*, a Hispanic-serving institution (HSI) located within the Yakama Nation reservation in central Washington.
- *Northwest Indian College* (NWIC), a tribal college in northern Washington.
- *Seattle Central Community College* (SCCC), an urban community college with high minority enrollment.
- *Seattle University*, the largest independent university in the Pacific Northwest.
- *University of Puget Sound*, a four-year liberal arts college located in Tacoma.
- *Washington State University* (WSU), a major research university and the state's land grant university.
- *Western Washington University*, home to the Science, Mathematics, and Technology Education (SMATE) program for pre-service teachers and education research.
- *Whitman College*, a private liberal arts school located in central Washington.
- *Whitworth University*, a private liberal arts school located in eastern Washington.

K-12

- *North Central Educational Service District* (NCESD), the largest ESD in the state, serving a mostly rural, economically disadvantaged, Hispanic and Native American population.

Informal Education

- *Museum of Flight* (MoF), a provider of informal education and training for pre-college students and in-service teachers.
- *Pacific Science Center* (PSC), a provider of informal education and training for pre-college students and in-service teachers.

WSGC industry partners within the field of aeronautics and astronautics are Aerojet, Eagle Harbor Technologies, and Tethers Unlimited, Inc.; partner Woodruff Scientific, Inc. is focused on new energy technologies. Educational partners are North Seattle Community College (NSCC), a two-year college serving north Seattle and the neighboring suburbs; Edmonds Community College, a two-year college that participates through its collaboration with Central Washington University; and Everett Community College (EvCC), a two-year college with strong ties to the state's aerospace and manufacturing companies.

The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.